Identification of Wetlands and Vernal Pools in Bar Harbor from Aerial Photography

December 2008

Presented To:
Bar Harbor
Conservation Commission

Presented By:
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Introduction

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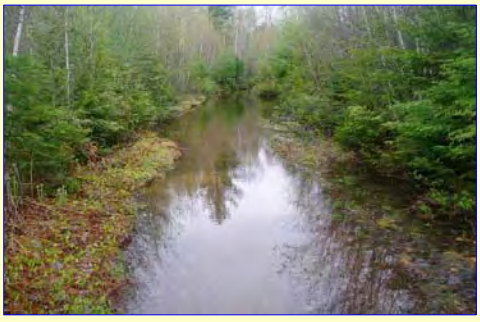

Stantec is an environmental consulting firm specializing in wetland and wildlife resource identification and mapping, wetland mitigation and restoration, environmental risk assessments, and environmental permitting.

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Study Objectives

AERIAL PHOTOGRAPHY INTERPRETATION:

- Identify wetlands greater than one acre in size within the town boundaries
- Identify "potential" vernal pools of any size within the town boundaries

Spring Peeper (*Pseudacris crucifer*)

FIELD VERIFICATION:

- Conduct limited field verifications to check accuracy of the identified boundaries

MAPPING:

- Map identified wetlands and vernal pools using GIS software
- Assemble data into GIS shape files for use by Bar Harbor

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Methods Overview

- Town obtained a new set of digital, color-infrared aerial photos from Kappa Mapping (Bangor). Photos were taken on April 12, 2008.
- Kappa Mapping processed this digital imagery and provided it to Stantec for use with our "softcopy" photo interpretation technology.
- Photos were viewed in 3-D on a stereo monitor by a wetland scientist.
- Boundaries of identified wetlands and potential vernal pools were digitized into GIS format using ArcMap™ software.
- Wetlands and vernal pool habitat types were also recorded.
- Wetland boundaries were checked against existing wetlands mapping information from the National Wetlands Inventory (NWI).
- A Stantec wetland scientist field-checked a sample of the mapped wetlands and potential vernal pools.
- GIS boundaries were then adjusted as needed to reflect field verification work.
- Final GIS data were assembled into a shape file format for use by Town.

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Digital Aerial Photo Interpretation

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Important Caveats

- Identification through remote sensing methods is intended for planning purposes only, and is but the first step in mapping wetlands and vernal pools.
- Mapping information from remote sensing studies should not be used as a substitute for on-the-ground delineations by qualified wetland scientists, and cannot be used for determining jurisdiction under local, state, and federal regulations.
- Some wetlands are easily identifiable from aerial photos, others are not. This is an inherent limitation of aerial photo interpretation. On-the-ground delineations typically identify more wetlands, particularly the forested type. Aerial photo interpretations can under-report wetlands by 10 to 50 percent, depending on the habitat conditions.
- All vernal pool features identified through remotes sensing are considered "potential" vernal pools until they have been field-checked during the appropriate season to determine breeding activity by vernal pool species.
- Like wetlands, aerial photo interpretation can miss vernal pools, particularly those located under dense, evergreen trees. Again, an inherent limitation.
- This vernal pool mapping effort represents a somewhat conservative approach in that we mapped those features that appeared to contain suitable conditions for vernal pool species. Many of these "potential" vernal pools may not meet the State of Maine or US Army Corps of Engineers definitions and therefore may not be regulated by these agencies, even though there could be breeding activity by vernal pool species in some or many years.

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What is a Wetland?

Freshwater Wetlands are swamps, marshes, bogs, meadows, forests and other areas that are:

1. Inundated or saturated by surface or groundwater long enough during the year to support plants that are adapted for life in saturated (moist or wet) soils, and
2. Not considered part of a great pond, coastal wetland, river, stream, or brook.

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Wetland Types

The typical freshwater wetland types found in Maine include:

1. Emergent (PEM)
2. Scrub-Shrub (PSS)
3. Forested (PFO)
4. Open Water (PUB)

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What is a Vernal Pool?

There is no one definition for a vernal pool that will satisfy all ecological and regulatory concerns, but from an ecological perspective, vernal pools can be described as follows:

Physical Characteristics - Vernal pools are seasonal bodies of water that attain maximum depths in spring or fall, and lack permanent surface water connections with other wetlands or water bodies. Vernal pools lack established fish populations because of periodic drying. Pools typically fill in the spring with snowmelt, rain, and runoff, although some may be fed primarily by groundwater. The duration of surface flooding, or "hydroperiod", varies considerably depending on the individual pool and the amount of precipitation in a given year. Hydroperiods range from less than 30 days to year-round. Many pools become completely dry as summer progresses. Some have flowing inlets and/or outlets for part of the year. Vernal pools are generally less than 2 acres in size, though some are larger. Vegetation in and around vernal pools varies widely.

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Example Vernal Pool - Spring Time

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Example Vernal Pool – Spring Time

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Another Example in Spring

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An Example of a Very Shallow Forest Pool

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A Large, Deep Pool

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A Vernal Pool in Late Summer

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Another Vernal Pool in Summer

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Vernal Pool Ecology

Vernal pools provide the primary breeding habitat for one or more amphibian and invertebrate species. In Maine, these "indicator" species include:

- wood frogs (*Rana sylvatica*),
- spotted salamanders (*Ambystoma maculatum*),
- blue-spotted salamanders (*Ambystoma laterale*), and
- fairy shrimp (*Eubranchipus* spp.)

Vernal pools can also provide valuable habitat for several rare, threatened, and endangered species, which may include blandings turtles (*Emydoidea blandingii*), spotted turtles (*Clemmys guttata*), four-toed salamander (*Hemidactylium scutatum*), and certain rare dragonflies.

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Vernal Pool Species – Wood Frog

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Spotted Salamander

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Wood Frog Egg Masses in a Pool

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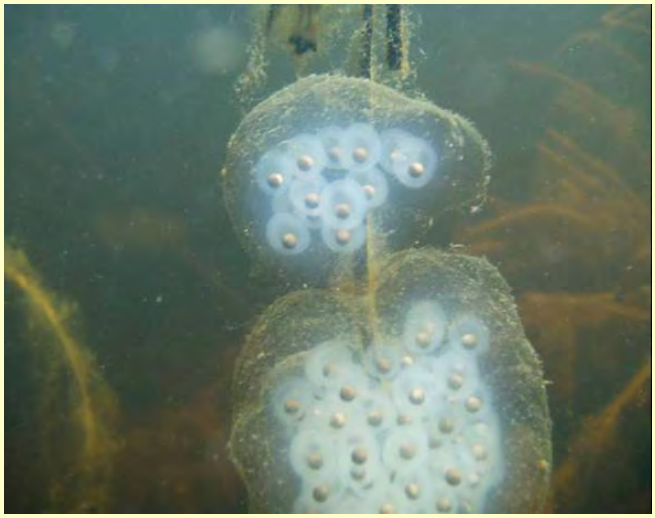
Spotted Salamander Eggs



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Fairy Shrimp

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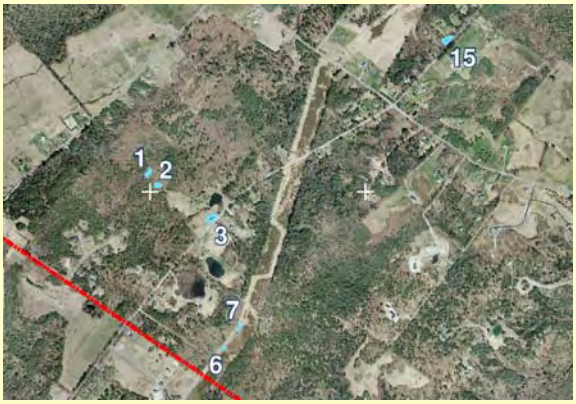
Surrounding Terrestrial Habitat

The lands adjacent to vernal pools are also important, and provide critical terrestrial habitat for the adult frogs and salamanders and the developing juveniles that emerge from the pools. Most vernal pool species spend the majority of their lives outside the pools and depend on the surrounding landscape for their survival.



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Field Checking Results

- A Stantec wetland scientist field-checked a sample of the boundaries of the wetland and potential vernal pool on August 28, 2008.
- She checked approximately 40 wetland sites and another 30 potential vernal pools.
- These field visits were primarily limited to public lands within the National Park and on public school properties.
- Field checks showed that wetland and potential vernal pool boundaries from our aerial photo interpretation exhibited an acceptable level of accuracy, consistent with typical remote sensing delineations.
- A few minor adjustments to the mapped boundaries were later made as a result of the field work.
- Based on the field checks, we were very pleased with the overall level of mapping accuracy. However, we do expect discrepancies and errors to be discovered as formal, on-the-ground wetland delineations and vernal pool surveys are made in the future.

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Mapping Results - Wetlands

Table 1. Summary of Wetlands Identified in Bar Harbor through Aerial Photo Interpretation

Dominant Wetland Type	Total Size (Acres)
Coastal (Estuarine and Marine)	72
Pond/Lake	717
Stream/River (may include other wetland types)	111
Emergent (includes marshes and wet fields)	244
Scrub-Shrub	1,448
Forested	1,559
Open Water	64
Total:	4,215

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Wetland Results

- 4,215 acres amounts to approximately 15 percent of the total land area in the town.
- Wetlands are distributed throughout the town, but the less-mountainous western half contains the majority.
- The western portion of the town contains some very large and diverse wetland systems, including several large bog or fen-type wetlands.
- Coastal marshes are largely absent due to the lack of suitable, low-lying topography.
- Forested and shrub-dominated wetlands are by far the most common types.

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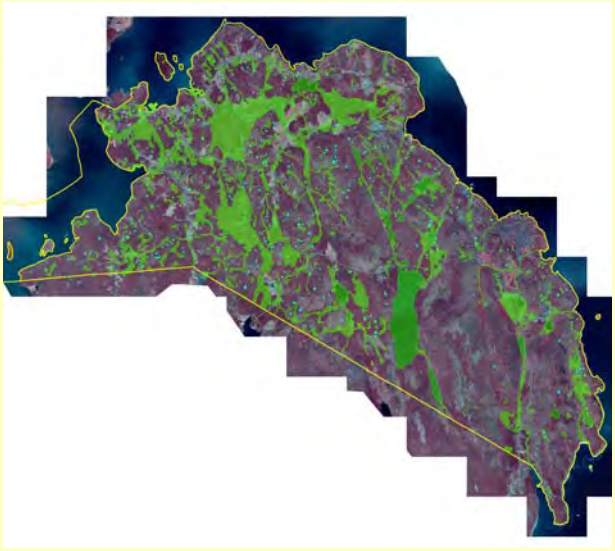
Overall Wetland Distribution



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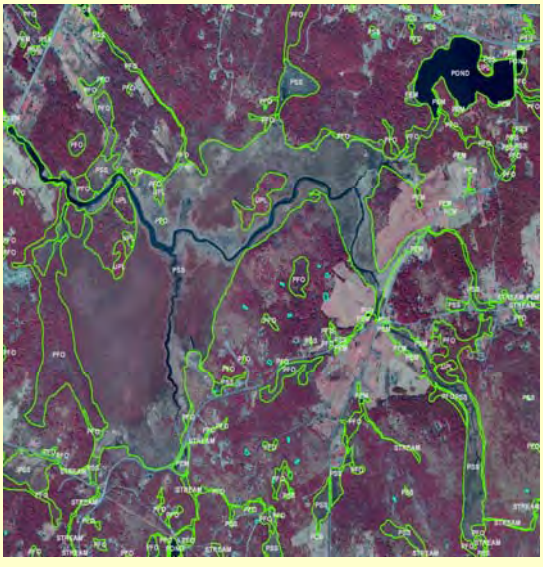
Fresh Meadow/Northeast Creek Area South of Route 3



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North End of *Eagle Lake*

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Mapping Results – Potential Vernal Pools

- We identified 297 potential vernal pools totaling about 22 acres.
- The smallest is approximately 80 square feet, the largest 27,340 square feet (0.63 acres).
- Potential vernal pools are scattered throughout the town, from coastal areas and interior forests to mountain ridges.
- Many of the pool features we located are within or part of a mapped wetland. Others appear to be truly isolated pools surrounded by upland habitat.
- The isolated pools may be wetlands in themselves but are not mapped as such because the pool boundary appears one in the same with the wetland boundary.

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Vernal Pool Results

- Most potential vernal pools are likely of natural origin, though many appear to be man-made or historically altered in some way.
- Many potential pools are situated near roads, driveways, buildings, and other development.
- Some of the pools we identified are known vernal pools being tracked by Acadia National Park biologists.
- It is possible that some or many of the potential pools we located will not be functioning as vernal pools, will not meet the State of Maine definition for Significant Vernal Pool, or will otherwise not be under the jurisdiction of State or Federal regulations.

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Overall Vernal Pool Distribution

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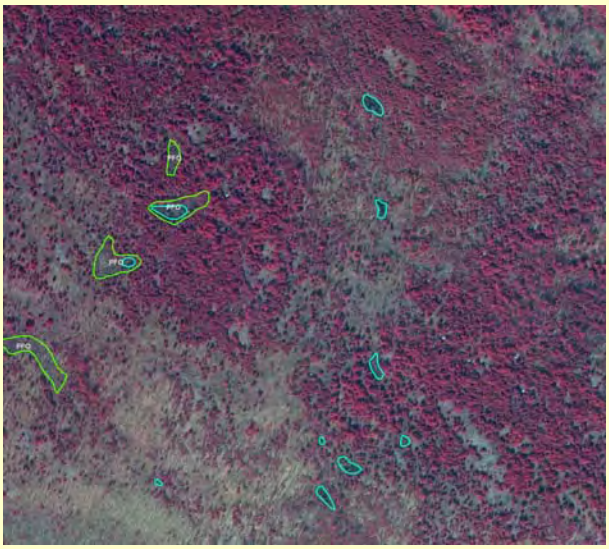
Examples of Mapped Potential Vernal Pools



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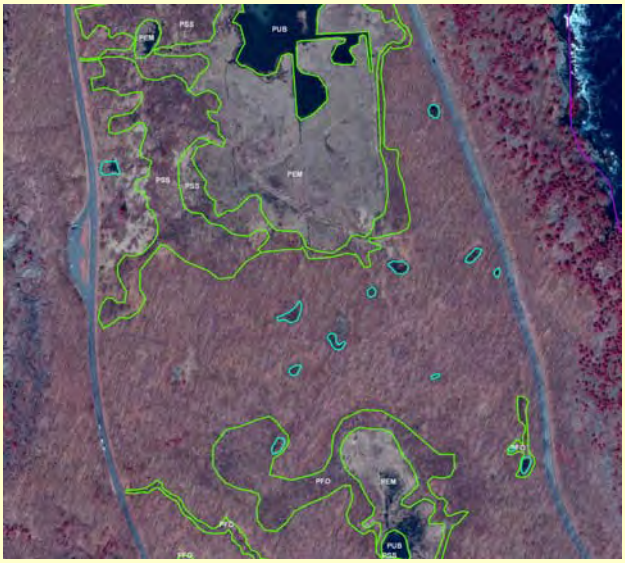
More Examples – Near Schooner Head



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Wrap-Up – Questions?

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